

ASEAN Power Grid (APG):

Regional integration on electricity interconnectivities

SIEW Thinktank Roundtable

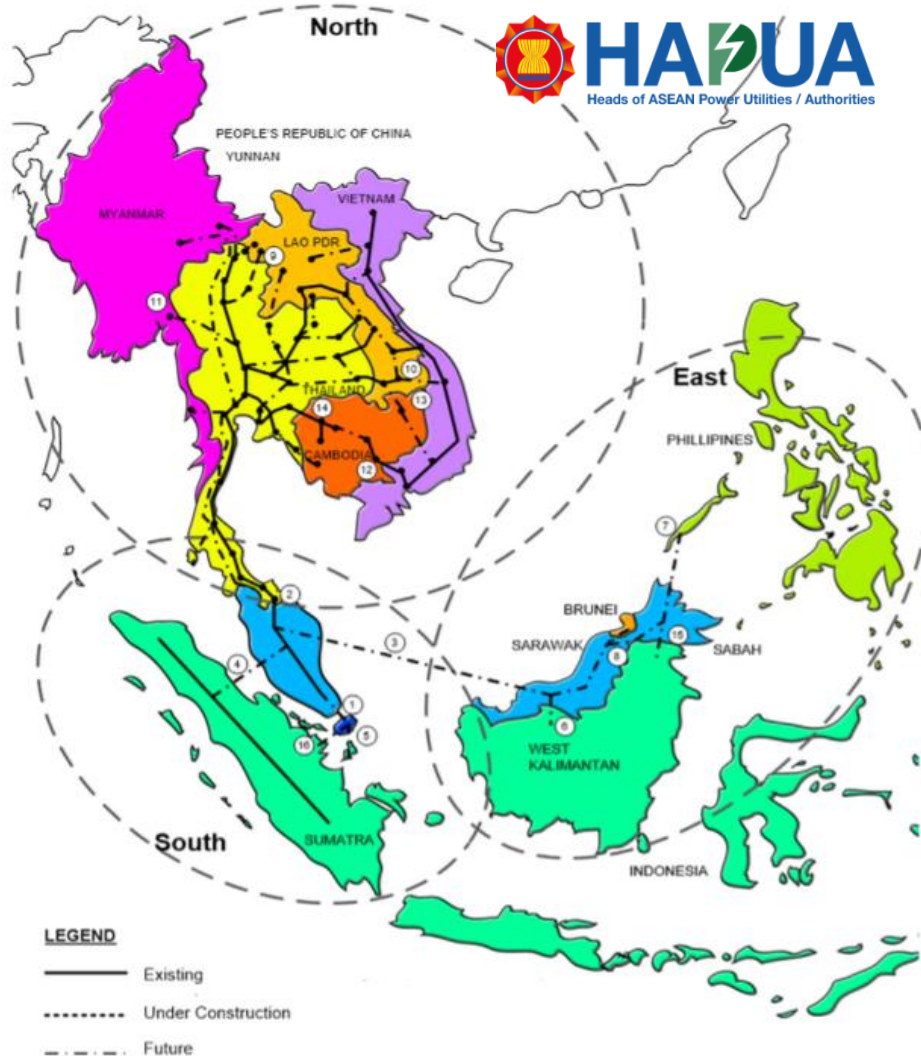
ESCAP's Sustainable Connectivity in Asia-Pacific: Challenges and Opportunities in Cross-Border Power System Connectivity

Friday, 29 October 2021



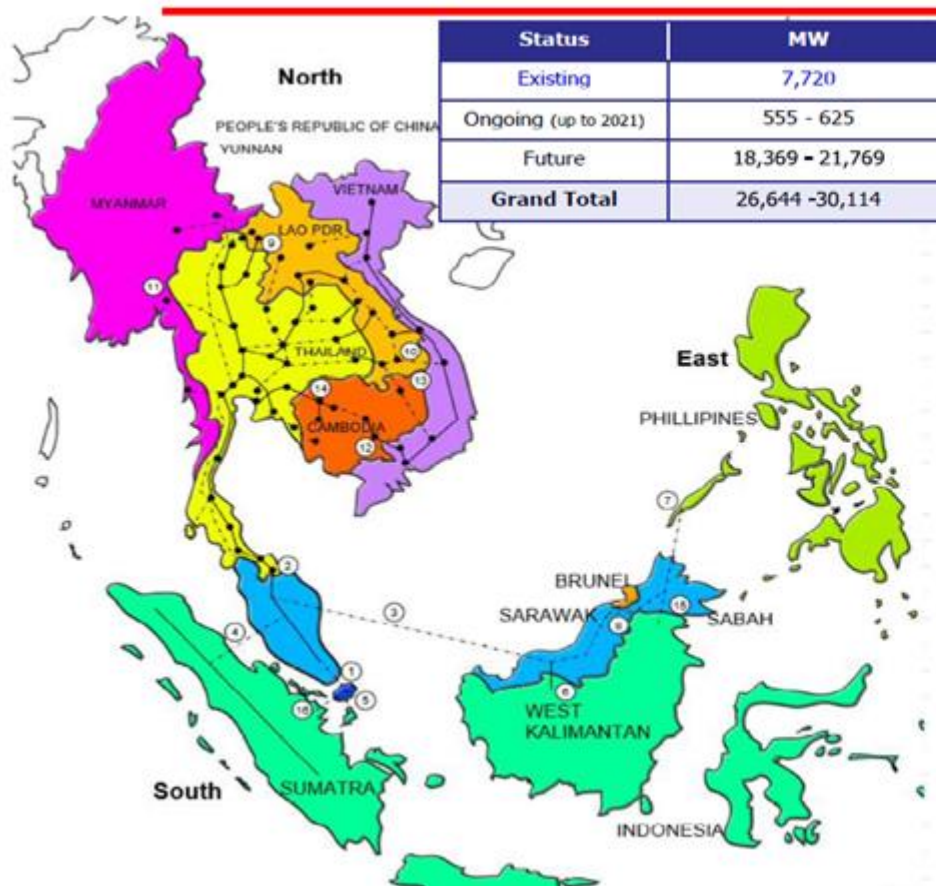
One Community
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Energy

ASEAN Power Grid (APG) – aspiration for regional integration



- The establishment agreement of electricity interconnecting agreements within ASEAN through the ASEAN Power Grid (APG) was adopted in 1997.
- The APG is envisioned to serve towards ensuring regional energy security while promoting efficient use and sharing of energy resources.
- The APG would enable countries to meet rising electricity demand, improve access to energy services in the region and contribute to the region's sustainability goals by promoting clean energy and renewable energy integration.
- It is started with cross-border bilateral terms, then gradually expanding to sub-regional basis and, finally to a totally integrated Southeast Asian power grid system.

Progress on cross-border bilateral interconnections



Status	MW
Existing	7,720
Ongoing (up to 2021)	555 - 625
Future	18,369 - 21,769
Grand Total	26,644 - 30,114

- 1) **P. Malaysia – Singapore**
 - Plentong – Woodlands Existing 2020
 - P. Malaysia – Singapore (2nd link Plentong – Woodlands)
- 2) **Thailand – P. Malaysia**
 - Sadao - Chuping Existing
 - Khlong Ngae – Gurun Existing
 - Su Ngai Kolok – Rantau Panjang TBC
 - Khlong Ngae – Gurun (2nd Phase, 300MW) TBC
- 3) **Sarawak – P. Malaysia** TBC
- 4) **P. Malaysia – Sumatra** TBC
- 5) **Batam – Singapore** Existing
- 6) **Sarawak – West Kalimantan** 2022
- 7) **Philippines – Sabah** 2021
- 8) **Sarawak – Sabah - Brunei** 2022
 - Sarawak – Brunei
 - Sarawak – Sabah
- 9) **Thailand – Lao PDR**
 - Nakhon Phanom - Thakhek - Theun Hinboun Existing
 - Ubon Ratchathani 2 - Houay Ho Existing
 - Roi Et 2 – Suvarnakhet - Nam Theun 2 Existing
 - Udon Thani 3 - Na Bong - Nam Ngum 2 Existing
 - Nakhon Phanom 2 – Thakhek – Then Hinboun (Exp.) Existing
 - Mae Moh 3 – Nan2 – Hong Sa (3Units) Existing
 - Udon Thani 3 – Nabong (converted to 500KV) Existing
 - Ubon Ratchathani 3 – Pakse – Xe Pian Xe Namnoy Existing
 - Khon Kaen 4 – Loi 2 – Xayaburi Existing
 - Thailand – Lao PDR (New) TBC
- 10) **Lao PDR – Vietnam**
 - Xekaman 3 – Thanh My Existing
 - Xekaman 1 – Pleiku 2 Existing
 - Nam Mo - Ban Ve TBC
 - Luang Prabang - Nho Quan TBC
- 11) **Thailand – Myanmar** TBC
- 12) **Vietnam – Cambodia (New)**
 - Chau Doc – Takeo – Phnom Penh Existing
 - Tay Ninh – Stung Treng TBC
- 13) **Lao PDR – Cambodia**
 - Ban Hat - Kampong Sralao Existing
 - Ban Hat - Stung Treng Existing
- 14) **Thailand – Cambodia (New)**
 - Watthana Nakhon – Aranyaprathet – Banteay Meanchey Existing post 2020
 - Thailand – Cambodia Existing post 2020
- 15) **East Sabah – North Kalimantan** TBC
- 16) **Singapore – Sumatra** TBC

LEGEND

- Existing
- Under Construction
- - - Future

TBC stands for to be confirmed

The Existing Project as of April 2020

The Priority Projects, which refer to the APAEC 2016-2020, are underlined and indicated in Red.



Pathfinder for promoting regional power integration

Lao PDR – Thailand – Malaysia – Singapore Power Integration Project (LTMS-PIP)

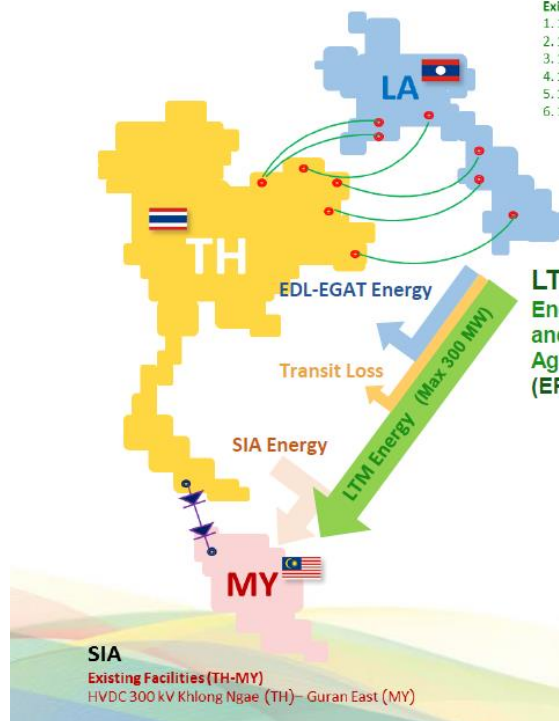
LTM – PIP



EDL-EGAT PPA

Existing Facilities (TH-LA)

1. 115 kV Nong Khai (Thailand) – Vientian (Lao PDR)
2. 115 kV Nong Khai (Thailand) – Thanaleng (Lao PDR)
3. 115 kV Bueng Kan (Thailand) – Pakxan (Lao PDR)
4. 115 kV Nakhon Phanom (Thailand) – Thakhek (Lao PDR)
5. 115 kV Mukdahan 2 (Thailand) – Savannakhet (Lao PDR)
6. 115 kV Sirindhorn (Thailand) – Bang Yo (Lao PDR)



LTM-PIP : Energy Purchase and Wheeling Agreement (EPWA)

Energy Traded so far.....



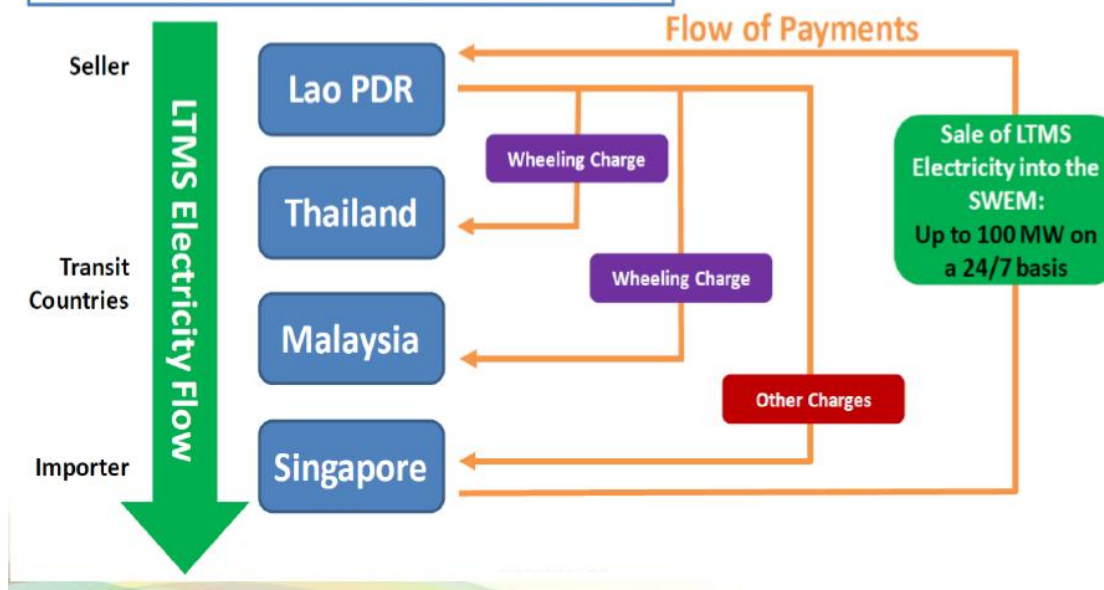
As at Dec 2020
31.92 GWh

LTMS – PIP



Proposed LTMS Framework

Duration: 2-year project period from Jan 2022 – Dec 2023



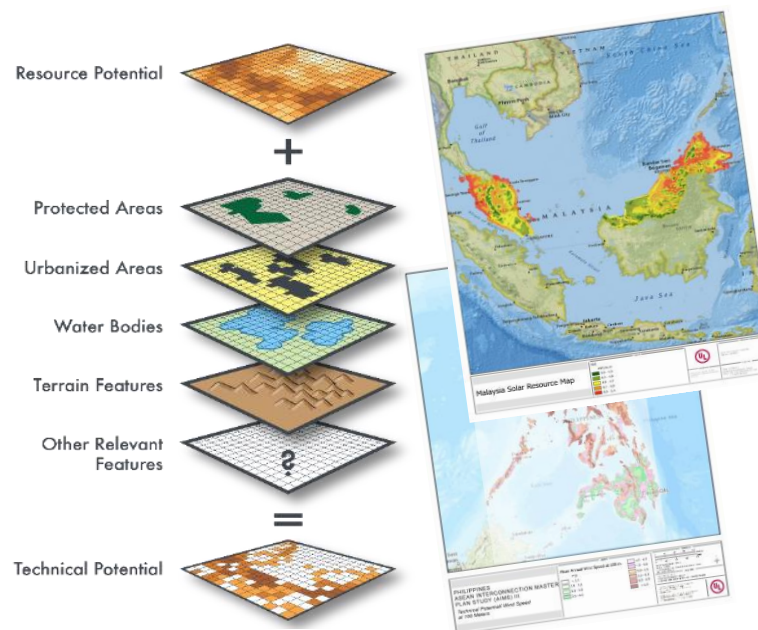
AIMS III – updating the regional masterplan for higher RE penetration

- ASEAN Interconnection Masterplan Study (AIMS) III sets out the transmission infrastructure needed to support multilateral power trade in ASEAN and renewable energy integration into the ASEAN Power Grid (APG), as adopted at the 39th ASEAN Ministers on Energy Meeting (AMEM) on 15 September 2021.

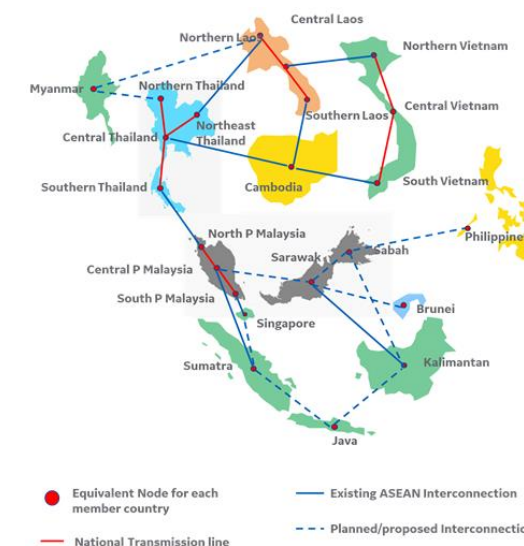
➤ Exploration of the scenarios

Base Case	Reflecting the existing/planned national PDP
Optimum RE	Co-optimization of interconnection capacity and vRE & conventional generation expansion.
APAEC RE Target	Optimization of vRE capacity and interconnections to achieve 23% RE in energy mix by 2025.
Higher vRE	Explore the potential of having higher vRE for advancing multilateral power trade.

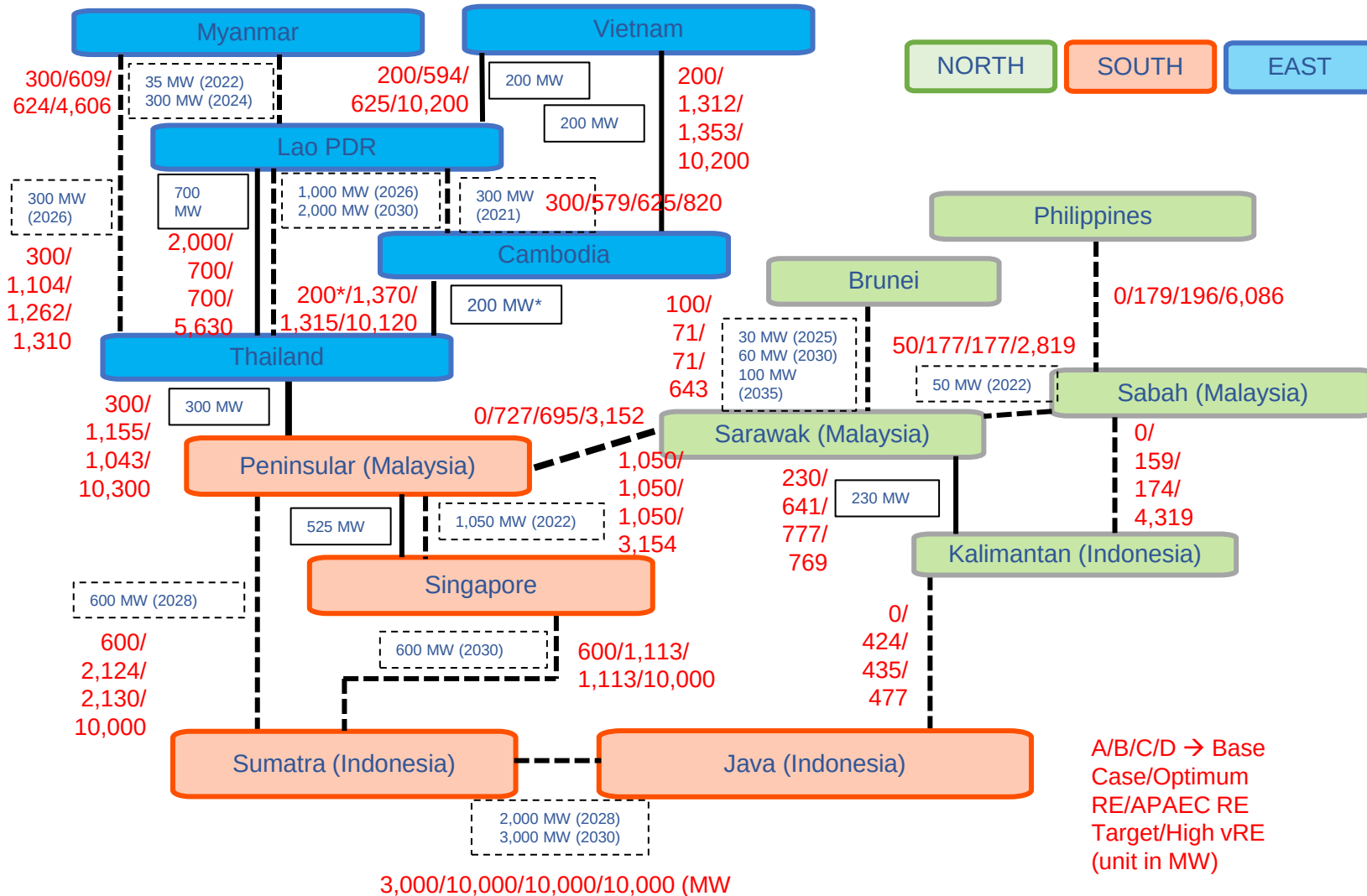
➤ Assessment of vRE potential



➤ Optimisation of Interconnections



Regional Aspiration – electricity interconnections for higher RE penetration



- Under the Base Case, there will be 3,480 MW interconnection capacity in 2025* and will reach 9,350 MW in 2040.
- Pushing ASEAN RE Target in 2025 will require 15,246 MW interconnection capacity.
- Potential commitment to establish the priority projects under the APG.

*only considering grid-to-grid, dedicated transmission lines are excluded.

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